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Scuttle flies (Diptera: Phoridae) from caves in Alabama and Georgia, USA

R. Henry L. DISNEY [1], Joshua W. CAMPBELL [2]

[1] Department of Zoology, University of Cambridge, Downing Street, Cambridge CB2 3EJ, UK; e-mail: rhld2@hermes.cam.ac.uk
[2] Shorter College, School of Sciences and Mathematics, 315 Shorter Ave., Rome, GA 30165, USA; e-mail: joshw.campbell@gmail.com

ABSTRACT
Four species of scuttle fly are reported from caves in Alabama and Georgia.

Key words: Diptera, Phoridae, caves, new records, USA

INRODUCTION

The most recent paper on scuttle flies (Diptera: Phoridae) recorded from caves in the USA (Disney et al 2010), reviewed previous identifications of Phoridae from caves in the USA and added new records from Arkansas and Missouri. Their review included revision of previous records for Alabama and Georgia (Reeves and Disney 1999) by showing that the three commonest cave dwelling species in the USA belong to a sibling species complex. In this paper we report on further collections from caves in the latter two states.

METHODS

All of the flies were captured by JC with ramp-pitfall traps baited with liver and bananas. The traps were left in each cave for 14 days. The specimens were preserved in alcohol (70% ethanol) and were identified by RHLD, who slide mounted samples of each species in Berlese Fluid (Disney 2001).

Slide mounted samples are deposited in the University of Cambridge, Museum of Zoology (UCMZ). For these slide mounted specimens the labels include a code such as 31-98, which refers to RHLD's notebook 31 page 98. The distances in metres from the cave entrances are given thus 5 m, 75 m, etc.

RESULTS

The following species were collected, all belonging to the enormous genus *Megaselia* Rondani 1856. This is one of the largest genera of Diptera known. Provisional keys to the Nearctic species were provided by Borgmeier (1964, 1966). Important revisions and additions are given by Robinson (1978, 1981), but these do not cover the section of the genus that includes the species *M. cavernicola* that has been repeatedly reported from American caves and mines. However, it is now realized that this species belongs to a sibling species complex (Disney et al 2010) and that some previous reports of *M. cavernicola* probably refer to other species or to mixed samples that may or may not include *M. cavernicola*. They also provide a key to the five Nearctic species of *Megaselia* known to be cavernicolous. Other species, such as the *M. scalaris* reported below, are only of casual occurrence in caves and are typically only found close to the cave entrance.

Megaselia breviterga (Lundbeck, 1920)
Aphiochaeta breviterga Lundbeck, 1920: 33 (female)
Apohiochaeta similata Lundbeck, 1921: 140 (male)
Megaselia spelunciphila Disney in Reeves & Disney 1999: 211.

Material examined: ALABAMA, Jackson County, Sauta Cave, July 2008, 5 m, 43 M, 81 F. Morgan County, Anvil Cave, July 2009, 5m, 5 M, 9 F; 75 m, 1 M, 49 F; 150 m, 8 F; Cave Springs Cave, July 2008, 5 m, 6 F; 75 m, 1 M, 12 F; 75 and 125 m, July 2008, 2 M, 1 F. GEORGIA, Dade County, Byers Cave, June 2009, 75 m, 1 M; Howard's Waterfall Cave, June 2008, 5 m, 3 M, 27 F; 75 m, 1 M, 3 F. Walker County, Harisburg Cave, June 2008, 5 m, 12 M, 18 F; 75 m, 1 F; Pettyjohns Cave, May 2009, 5 m, 5 M, 13 F.

Megaselia cavernicola (Brues, 1906)
Aphiochaeta cavernicola Brues, 1906: 101.

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Material examined: ALABAMA, Jackson County, Sauta Cave, July 2008, 5 m, July 2008, 1 M, 2 F; Morgan County, Anvil Cave, July 2009, 75 m, 5 M, 8 F; 150 m, 5 M, 5 F; Cave Springs Cave, July 2008, 5 m, 1 F: 75 m, 2 M, 2 F; and 125 m, 1 M, 2 F. GEORGIA, Dade County, Byers Cave, June 2009, 75 m, 5 M, 5 M; 225 m, 9 M, 11 F; Howard's Waterfall Cave, June 2008, 75 m, 16 M, 24 F; 150 m, 9 M, 23 F; 225 m, 11M, 18 F; Walker County, Harisburg Cave, June 2008, 5 m, 2 M, 6 F; 75 m, 10 M, 29 F; 150 m, 9 M, 31 F; 225 m, 19 M, 54 F; Howard's Waterfall Cave, June 2008, 75 m, 16 M, 24 F; 150 m, 9 M, 23 F; 225 m, 11M, 18 F; Pettyjohns Cave, May 2009, 5 m, 4 F; 75 m, 2 M, 23 F; 150 m, 6 M, 19 F; 225 m, 4 M, 6 F; 375 m, 2 M, 23 F; 600 m, 3 M, 12 F.

Megaselia scalaris (Loew, 1866)
Phora scalaris Loew,1866: 53.

This species, whose larvae feed on an exceptionally wide range of decaying organic materials, has been carried around the world by man (Disney 2008). It has been reported from Santee Cave in South Carolina (Reeves, 2001) and from caves in Trinidad (Disney 1995).

Material examined: ALABAMA, Morgan County, Cave Springs Cave, July 2008, 5 m, 4 F.

Megaselia taylori Disney, 2010
Megaselia taylori Disney in Disney et al 2010: 86.

Material examined: ALABAMA, Jackson County, Sauta Cave, July 2008, 5 m, 24 M, 143 F. Morgan County, Anvil Cave, July 2009, 5m, 5 M, 31 F; 75 m, 34 F; 150 m, 8 F; Cave Springs Cave, July 2008, 5 m, 46 F; 75m, 1 M, 31 F. GEORGIA, Dade County, Byers Cave, June 2009, 5 m, 2 M, 18 F; Howard's Waterfall Cave, June 2008, 5 m, 1 M, 8 F; 75 m, 1 F. Walker County, Harisburg Cave, June 2008, 5 m, 6 F; Pettyjohns Cave, May 2009, 5 m, 4 F;

DISCUSSION

The above records confirm that the regular cavernicolous species in caves in the southern half of the USA are *Megaselia breviterga, M. cavernicola* and *M. taylori*. 53% of the *M. breviterga* (n = 406) were caught at the 5 m point from the cave entrances, but only 9.7% of *M. cavernicola* (n = 426) were caught at this point in contrast to 75.4% of the *M. taylori* (n = 363). This suggests that *M. cavernicola* is the most cavernicolous of these three species and that *M. taylori* is the least so adapted. This confirms the conclusions of Disney et al (2010).

The sex ratios differ from those reported by Disney et al (2010) for flies procured with pitfall traps baited with Limburger cheese spread. Thus they reported 56.85% of the 489 *M. breviterga* they collected were females. By contrast, 81.2% of the 406 flies of this species reported above were females. Likewise of the 253 *M. cavernicola* they collected 84.58% were females but for our 530 flies of this species 70.38% were females; and for their 332 flies of *M. taylori* 82.83% were females compared with 90.9% for our 363 flies of this species. These differences are likely to reflect differences in the methods of collection. In their study their use of a different bait probably accounts for this difference. It is well established that every collecting method is selective with respect to which species are procured (e. g. Disney et al 1982). Our studies suggest that for some species there is also selectivity with regard to the ratios of the sexes caught.

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